SYNOPSIS

“Synthesis & Characterization of Transition & Inner-transition Metal complexes & their applications”

Short Resume Of The Plan Proposed For Investigation For Ph. D. Degree under the **Faculty Of Science**.

To be submitted to,

RRC COMMITTEE,

Swami Ramanand Teerth Marathwada University, Nanded

By

SHAIKH TOFIK HABIBSAB
(Research Scholar)
Dept. of Chemistry,
N.E.S.Science College, Nanded

Under the Guidance of

Dr. S. R. PINGALKAR

(Research Guide)
Head &Associate Professor,
P.G. Research Centre , Department of Chemistry,
N.E.S.Science College, Nanded
-431602(MS)

June-2019

ABSTRACT

"Synthesis & Characterization of Transition & Inner-transition Metal complexes & their applications"

Introduction:

The term Schiff base was invented by Hugo Schiff for the condensation reaction between an aldehyde and an amine. Schiff base ligands are able to coordinate metals through imine nitrogen and another group usually linked to aldehyde or ketone [1-2]. Schiff base complexes incorporating phenolic group as chelating moieties in the ligand are considered as models for executing important biological reactions and mimic the catalytic activities of metallo enzymes[3-4]. Recently, the Schiff bases ligand containing various donor atoms (like N, O, S etc.) and their metal complexes have been shown broad range of their application as biological, biochemical, analytical, antimicrobial, antibacterial, anticancer, antitumor and antifungal activity[5-9]. They used as catalyst, in medicine like antibiotics and anti-inflammatory agents and in the industry as anticorrosion. The synthesis of transitionmetal complexes with Schiff base ligands are considered due to sensitivity, selectivity and synthetic flexibility towards metal atoms[10] It is known that the existence of metal ions bonded to biologically active compounds may increase their activities[11-14]. In recent years, because of new interesting applications found in the field of medicine, the metal complexes with tridentate O, N, N types of alternative structures have attracted the attention of chemist. In this paper we describe the synthesis, characterization and behavior of the tetradentate Schiff bases of 4-aminoantipyrin ligands with various metal complexs[15-22]. The structures of all these complexes have been investigated by using elemental analysis, FTIR, elemental analysis, magnetic susceptibility and conductivity measurements. Although 4-aminoantipyrin itself exhibits antimicrobial activity, its activity can be enhanced by formation of its Schiff's bases by condensation with aldehydes, ketones, carbazides etc. Antibacterial activities of these complexes were determined as MICs values using the micro dilution broth method against gram-positive bacteria, Staphylococcus aureus and Bacillus subtilis.

Review of literature and Development in the subject

Deshpande, et al., (2013) had main focus on synthesized 12 transition metal complexes of Schiff bases are discussed, Schiff bases are obtained by condensation of 2-amino-4, 6-dimethyl benzothiazole with pyrrole 2-aldehyde, Pyridine-2-carbaldehyde, and Cu (II), Co (II), Mn (II), Fe (II), Cr (II) and Ni (II) chloride were chosen to synthesize new complexes. The Schiff bases and the complexes were characterized on the basis of spectral studies like IR, ^{1}H NMR, Mass studies. The ligands and their metal complexes were screened for antibacterial activity against various bacteria.

Gheorghe, et al., (2015) had main focus on twenty new Schiff bases derived from ortho-hydroxy aldehydes and aromatic or hetroaromatic amines have been synthesized in high yields via condensation in ethanol in the presence of catalytic amounts of sulfuric acid. These azomethines, useful as ligands, intermediates in organic synthesis or potential biologically active substances, have been characterized by elemental analysis, IR, ^{1}H and ^{13}C NMR spectra.

Iqbal., et al., (2009) had main focus on neutral complexes of Cu(II),Ni(II), and Co(II) with a Schiff base derived from benzaldehyde and sulfonamide have been synthesized and characterized the basis of on FTIR, UV -VIS, molar conductance and atomic absorption spectroscopic data. These metal complexes were also screened for their antibacterial activity against two bacterial species E.coli and Salmonella typhae. The metal complexes showed enhanced antibacterial activity as compared to uncomplexed ligand.

Jayabalakrishnan, et al., (2002) had main focus on prepared Schiff bases by condensing salicylaldehyde or O-vanillin with O-aminophenol and O- amino thiophenol in their effort to obtain different ruthenium complexes.

Synthesis

Scheme -

Substituted Aromatic Aldehydes + N-Containing Compounds ===➔Schiff Base

Metal ion + Schiff Base ===➔ Metal-Organic Complex

Metal Salt: M- Chloride, Nitrate, Sulphate, (M= Transition And inner transition Metals)

Aldehyde: Substituted Aromatic Aldehyde, Heterocyclic Aldehyde

N-Containing Compounds: Aromatic Amines, Heterocyclic amines

Objectives of Research/ Proposed work:

1. To design novel metal ligand complexes of inner-transition and transition metal series with eco-friendly methodologies
2. To study the pharmacological applications of these prepared Complexes
3. Biological evaluation of Complexes will be done for prepared complex
4. To Study Anti-cancerous activity for prepared Complex.

Characterisation

The prepared complex are characterised by ^{1}H-NMR, ^{13}C-NMR, IR, Mass, TGA, DTA, Micro bacterial activity i.e. antifungal, anti-bacterial; conductivity studies.

Proposed work plan/ Formulation and structure of study:

Year-wise plan of work and targets to be achieve:

- First 12 months are utilised for literature and the detail study the synthesis of complex
- Next 12 months involves design of novel Complexes through combination various Organic linker.
- Submit the progress report after six month.
- In last 12 months all complexes will be evaluated for their biological Activity and characterization.
- In due time magnetic properties, biological properties and physical properties will analized.
- Final draft of Ph. D. work.

References

1. Krishnankutty, K. and Ummathur, M. B. J. Indian Chem. Soc. 83: 663 (2006).
2. Schiff, H., Synthesis of Sciiff Bases. Ann. Suppl3: 343(1864).
3. Singh, B.K. and Adhikari, D. Intern. J. Basic Appl. Chem. Sci. 2: 84-107 (2012).
4. Khandar, A.A., Hosseini-Yazdi, S.A., Zarei, S.A and Rabie, U.M. Inorg. Chim. Acta. 358: 3211(200)
5. Manikshete, A.H., Sarsamkar, S.K., Deodware, S.A., Kamble V.N. and Asabe, M.R. Inorg. Chem. Commun. 14: 618–621 (2011).
6. Yamada, S. Coord. Chem. Rev. 190: 537(1999).
7. Cimernan, Z., Galic, N. and Bosner, B. Anal. Chim. Acta. 343: 145 (1997).
8. Panniyamurthy, T., Bhatia, B., Reddy, M.M., Maikap G.C. and Iqbal, J.Tetrahedron. 53: 7649 (1997).
9. Refat, M.S., Killa, H.M.A., Mansour, A.F. and Fetooh, H., Synth. React. Inorg. MetalOrg.Nano-Met. Chemist. 41: 295-308(2011).
10. Saritha, P., Reddy, B., Satyanarayan and Jayatyagaraju, J. Indian Chem. Soc. 83: 1204 (2006).
11. Mohamed, G.G., Omar, M.M. and Hindy, A.M. Turkish J. Chem. 30: 361-382(2006).
12. Phaniband, M.A. and Dhumwad, S.D. Trans. Met. Chem. 32: 1117(2007).
13. Bal Krishan, Om Prakash and E.H.ElMossalmy, Orient J. Chem., 29(1): 381-388 (2013).
14. Md. Aziz and Shamim Ahmad, Orient J. Chem., 27(2): 673-677 (2011).
15. H. Burroughes, D.D.C. Bradley, A.R. Brown, R.N. Marks, K. Mackay, R.H. Friend, P.L. Burn, A.B. Holmes, Nature 347 (1990) 539
16. D. Braun, A.J. Heeger, Appl. Phys. Lett. 58 (1991) 1982.
17. X.C. Li, S.C. Moratti, in D.L. Wise, D. Trantolo, G.E. Wnek (eds.), Electrical and Optical Polymer systems: Foundations, Methods and Applications, World Scientific, Singapore, 1997.
18. R.E. Holmlin, E.D.A. Stemp, J.K. Barton, J. Am. Chem. Soc. 118 (1996) 5236.
19. B.D. Marco, M, Lanza, M. Piernccini, S. Campagna, Adv. Mater. 8 (1996) 576.

20. K. Vinodgopal, H. Xua, R.L. Dahlgren, A.G. Lappin, L.K. Patterson, P.V. Kamat, J. Phys. Chem. 99 (1995) 10 883.
21. J.N. Demas, B.A. Degraff, Anal. Chem. 63 (1991) 829A.
22. K.F. Chin, Y.K. Cheng, K.K. Cheung, C.X. Gun, C.M. Che, J. Chem. Soc., Dalton Trans. (1995) 2967.

Mr .SHAIKH TOFIK HABIBSAB
(Research Scholar)

Dr. S. R. PINGALKAR,
(Research Guide),
Head and Associate Professor,
Dept. of Chemistry, P.G Dept.of Chemistry,
N.E.S.Science College Nanded,
Nanded-431602